Nos. 22-1325, -1327, -1453, -1457

In the

United States Court of Appeals for the Federal Circuit

APPLE INC.,
Appellant,

v.

COREPHOTONICS, LTD.,
Cross-Appellant.

On Appeal from the Patent Trial and Appeal Board in
Inter Partes Review Nos. IPR2022-00878, IPR2020-00897, IPR2020-00896

PATENT OWNER-APPELLANT COREPHOTONICS, LTD.'S PRINCIPAL AND RESPONSE BRIEF

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RELEVANT CLAIM LANGUAGE AT ISSUE

Appeal number 22-1325 concerns claims 3, 8, 19, 24, 16 and 30 of U.S. Patent No. 10,330,897 ("'897 patent"). Appeal number 22-1327 concerns claims 2, 5, 6, 18, and 21-23. These claims and the claims they depend from recite as follows:

> 1. A lens assembly, comprising: a plurality of lens elements arranged along an optical axis and spaced apart by respective spaces, wherein the lens assembly has an effective focal length (EFL), a total track length (TTL) of 6.5 millimeters or less and a ratio TTL/EFL<1.0, wherein the plurality of lens elements includes, in order from an object side to an image side, a first group comprising lens elements L_{1_1}, L_{1_2} and L_{1_3} with respective focal lengths f_{1_1}, f_{1_2} and f_{1_3} and a second group comprising lens elements L_{2_1} and L_{2_2}, wherein the first and second groups of lens elements are separated by a gap that is larger than twice any other gap between lens elements, wherein lens element L_{1_1} has positive refractive power and lens element L_{1_2} has negative refractive power and wherein lens elements L_{2_1} and L_{2_2} have opposite refractive powers.
>
> 2. The lens assembly of claim 1, wherein the TTL is equal or smaller than 6.0 mm and wherein the lens assembly has a f-number F#<2.9.
>
> 3. The lens assembly of claim 1, wherein the TTL is equal or smaller than 6.0 mm and wherein lens element L_{1_1} has an image-side surface diameter between 2.3 mm and 2.5 mm.
>
> 5. The lens assembly of claim 1, wherein the lens assembly has a f-number F#<2.9.
>
> 8. The lens assembly of claim 5, wherein lens element L_{1_1} has a convex image-side surface.
>
> 16. The lens assembly of claim 2, wherein the lens assembly

further includes a ratio between a largest optical axis thickness L**11** and a circumferential edge thickness Lle of lens element L_{11} of L**11**/L**1***e*<3.

17. A lens assembly, comprising a plurality of lens elements arranged along an optical axis and spaced apart by respective spaces, wherein the lens assembly has an effective focal length (EFL), wherein a lens system that includes the lens assembly plus a window positioned between the plurality of lens elements and an image plane has a total track length (TTL) of 6.5 millimeters or less, wherein a ratio TTL/EFL <1.0, wherein the plurality of lens elements includes, in order from an object side to an image side, a first group comprising lens elements L_{1_1}, L_{1_2} and L_{1_3} with respective focal lengths f_{1_2} and f_{1_3}, and a second group comprising lens elements L_{2_1} and L_{2_2}, wherein lens element L_{1_1} has positive refractive power and lens element L_{1_2} has negative refractive power, wherein $1.2\times|f_{1\_3}|>|f_{1\_2}|>1.5\times f_{1\_1}$ and wherein lens elements L_{2_1} and L_{2_2} have opposite refractive powers.

18. The lens assembly of claim 17, wherein the TTL is equal or smaller than 6.0 mm and wherein the lens assembly has a f-number F#<2.9.

19. The lens assembly of claim 17, wherein the TTL is equal or smaller than 6.0 mm and wherein lens element L_{1_1} has an image-side surface diameter between 2.3 mm and 2.5 mm.

21. The lens assembly of claim 17, wherein the lens assembly has a f-number F#<2.9.

24. The lens assembly of claim 21, wherein lens element L_{1_1} has a convex image-side surface.

30. The lens assembly of claim 18, wherein the lens assembly further includes a ratio between a largest optical axis thickness L**11** and a circumferential edge thickness L**1** *e* of lens element L_{1_1} of L**11**/L**1** *e*<3.

UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

CERTIFICATE OF INTEREST

Case Number 2022-1325, 2022-1327

Short Case Caption Apple Inc. v. Corephotonics, Ltd.

Filing Party/Entity Cross-Appellant Corephotonics, Ltd.

Instructions: Complete each section of the form. In answering items 2 and 3, be specific as to which represented entities the answers apply; lack of specificity may result in non-compliance. **Please enter only one item per box; attach additional pages as needed and check the relevant box**. Counsel must immediately file an amended Certificate of Interest if information changes. Fed. Cir. R. 47.4(b).

I certify the following information and any attached sheets are accurate and complete to the best of my knowledge.

Date: 10/07/2022

Signature: /s/ Neil A. Rubin

Name: Neil A. Rubin

1. Represented Entities. Fed. Cir. R. 47.4(a)(1).	**2. Real Party in Interest.** Fed. Cir. R. 47.4(a)(2).	**3. Parent Corporations and Stockholders.** Fed. Cir. R. 47.4(a)(3).
Provide the full names of all entities represented by undersigned counsel in this case.	Provide the full names of all real parties in interest for the entities. Do not list the real parties if they are the same as the entities. ☑ None/Not Applicable	Provide the full names of all parent corporations for the entities and all publicly held companies that own 10% or more stock in the entities. ☐ None/Not Applicable
Corephotonics, Ltd.		Samsung Electronics Benelux B.V.

☐ Additional pages attached

4. Legal Representatives. List all law firms, partners, and associates that (a) appeared for the entities in the originating court or agency or (b) are expected to appear in this court for the entities. Do not include those who have already entered an appearance in this court. Fed. Cir. R. 47.4(a)(4).

☐ None/Not Applicable ☐ Additional pages attached

C. Jay Chung (formerly of Russ August & Kabat)	Jonathan Link (of Russ August & Kabat)	

5. Related Cases. Provide the case titles and numbers of any case known to be pending in this court or any other court or agency that will directly affect or be directly affected by this court's decision in the pending appeal. Do not include the originating case number(s) for this case. Fed. Cir. R. 47.4(a)(5). See also Fed. Cir. R. 47.5(b).

☐ None/Not Applicable ☐ Additional pages attached

Corephotonics, Ltd. v. Apple Inc., Case No. 5:19-cv-04809 (N.D. Cal.)		

6. Organizational Victims and Bankruptcy Cases. Provide any information required under Fed. R. App. P. 26.1(b) (organizational victims in criminal cases) and 26.1(c) (bankruptcy case debtors and trustees). Fed. Cir. R. 47.4(a)(6).

☑ None/Not Applicable ☐ Additional pages attached

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STATEMENT OF RELATED CASES

This is the only appeal from the *inter partes* review IPR2020-00878, and this is the only appeal that involves U.S. Patent No. 10,330,897.

The Court's decision in this appeal is likely to affect the following district court case where the '897 patent is presently asserted:

- *Corephotonics, Ltd. v. Apple Inc.*, Case No. 3:19-cv-04809-JD (N.D. Cal.)

PRELIMINARY STATEMENT[1]

In this IPR, Apple presented three grounds of obviousness. On two of the three grounds (Grounds 3 and 4), the Board correctly found that Apple had failed to make a sufficient showing on the key issue of whether one skilled in the art would have had a motivation to make the modifications proposed by Apple to satisfy the challenged claims. These determinations were supported by substantial evidence and otherwise procedurally proper, and they should be affirmed.

As to the remaining obviousness ground (Ground 2), the Board found that Apple had demonstrated obviousness. But in doing so, the Board improperly failed to consider and respond to Corephotonics' evidence showing a lack of reasonable expectation of success and improperly credited conclusory and untimely opinions of Apple's expert. This determination should vacated and remanded in order to permit the Board to conduct proper analysis.

[1] Corephotonics has filed an unopposed motion to dismiss Case Nos. 22-1453 and 22-1457. With the dismissal of these appeals, IPR2020-00896 and IPR2020-00897 are no longer at issue before the Federal Circuit, and this brief will not address these IPRs.

STATEMENT OF THE ISSUES

While not accepting Apple's characterizations of the record or of the Board's analysis, Corephotonics accepts Apple's identification of Issues 1 and 2, concerning Grounds 3 and 4 of the IPR. Corephotonics' cross-appeal presents a third issue:

3. Did the Board err in concluding that Apple had sufficiently demonstrated claims 2, 5, 6, 18, 21–23 to be obvious, when it failed to properly address Corephotonics' arguments concerning the reasonable expectation of success and improperly permitted Apple to introduce a new theory of how the prior art would have been combined in its reply?

STATEMENT OF THE CASE

A. Multi-Element Lens Designs Involve Numerous Interacting Parameters

The '897 patent is directed to miniature telephoto lens assemblies suitable for use in portable electronic products such as mobile phones. Appx532 (1:26–30). In order to produce a high-quality image, a lens must be able to produce an image that is sharply focused, both at its center and its edges, over the full range of color wavelengths the camera is sensitive to. It is also desirable that the lens provide a high and uniform brightness

in the image, allowing photos to be taken with exposures of a reasonable duration.

In order to achieve these results, lens designers use lens assemblies made of multiple lens elements, each with different complex shapes, generally using different materials with different optical properties in different lenses. While the invention of the '897 patent is not limited to designs with five lens elements, the specification includes preferred embodiments with that number of elements. Figure 1A of the '897 provides a cross section drawing of an example of such a design:

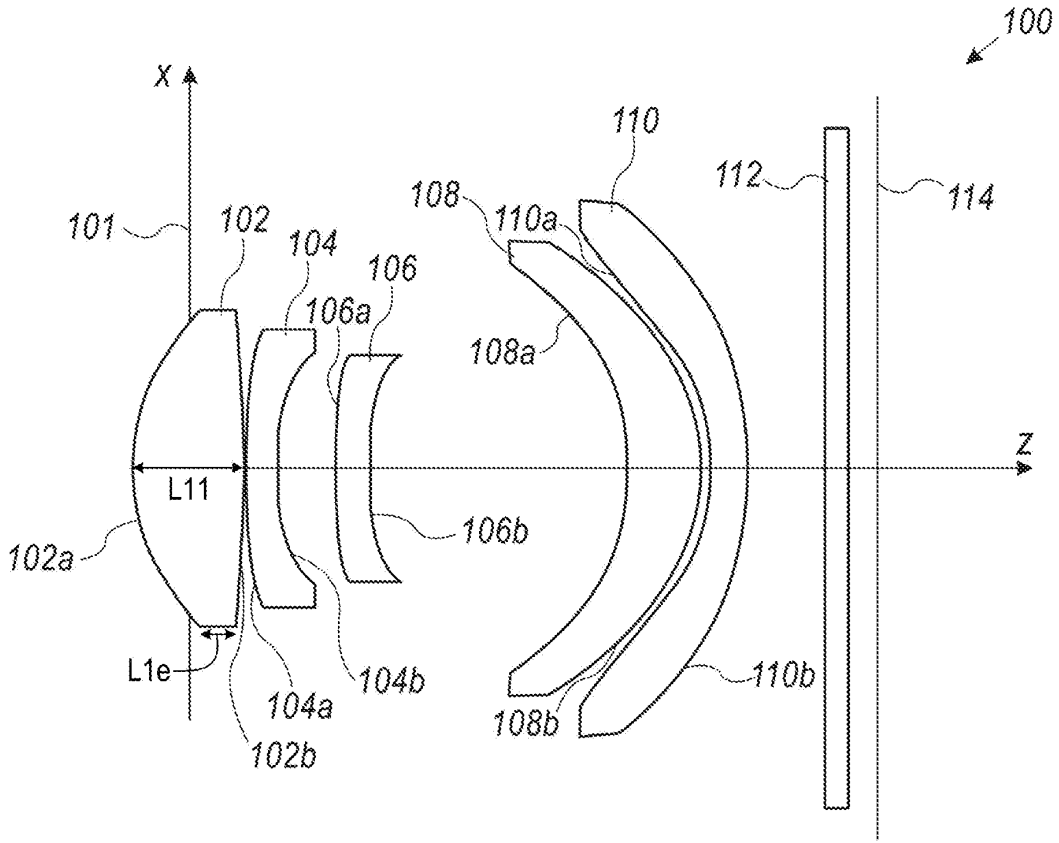


FIG. 1A

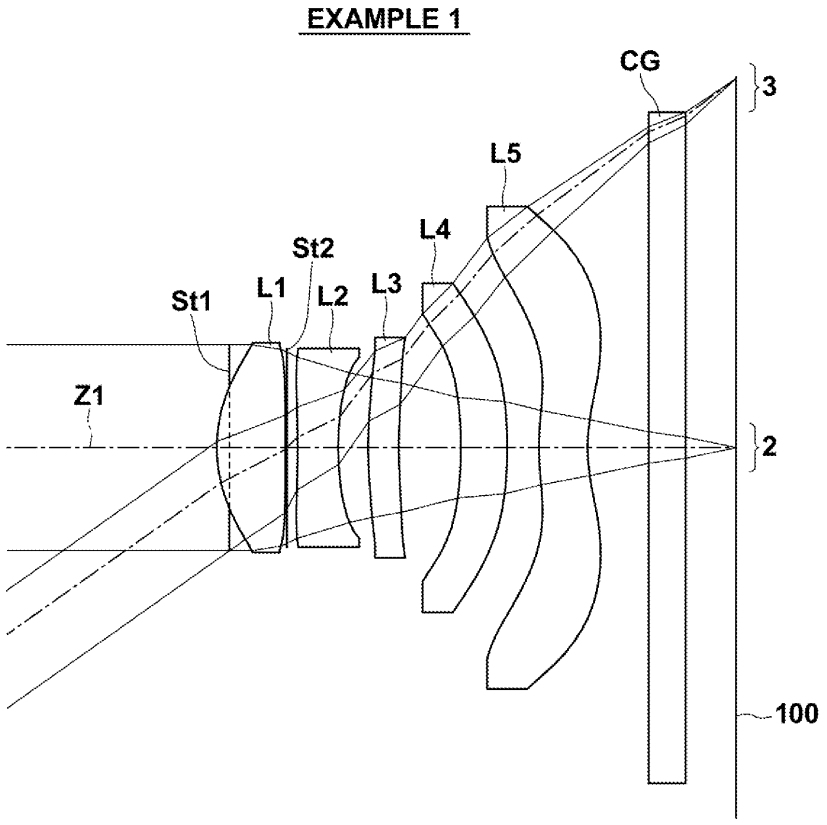
Appx526. The object or scene being photographed is located to the left of this drawing. Light from the object passes through the five lens elements of this design (labelled 102, 104, 106, 108, 110) from left to right, forming an image on the surface of an image sensor located at plane 114. Appx533 (3:24–45).

Increasing the number of lens elements gives the lens designer a greater number of parameters to vary when making tradeoffs between the various properties of the lens and generally allows the designer to

improve the quality of the image. Appx532 (1:41–45). However, increasing the number of lens elements may have disadvantages, such as tending to increase the "total track length" or TTL, which in '897 patent Figure 1A above is the distance along the "Z" (horizontal) axis, from the leftmost surface 102a to the rightmost surface 114. Appx532 (1:45–47, 2:7–9). A small TTL is important for a lens designed to be used in a mobile phone, Appx532 (1:38–41), and an important parameter to consider is the ratio of TTL to the "effective focal length" or EFL. The focal length of a lens determines the degree of magnification of the image produced by the lens. Appx4476 (¶ 39). Accordingly, a small ratio of TTL/EFL is necessary to achieve high image magnification from a lens assembly that is thin and thus suitable for use in a mobile phone. The '897 patent provides lens designs that offer superior image quality and smaller ratios of TTL/EFL than prior art lens designs and which are readily manufacturable. Appx532 (1:39–50, 2:48–50).

Obtaining a sharply focused image from a multi-element lens assembly requires that the shapes, positions, and optical properties of the lens elements all be chosen so that the elements work together. Figure 7 of the Ogino prior art patent that Apple relies upon illustrates the issue:

FIG.7



Appx1188. Much like the figure from the '897 patent discussed above, this drawing shows a cross-section of a five-element lens design, where light from an object enters at the left and forms an image on an imaging device 100 at the right of the drawing. Appx1198 (5:37–44).

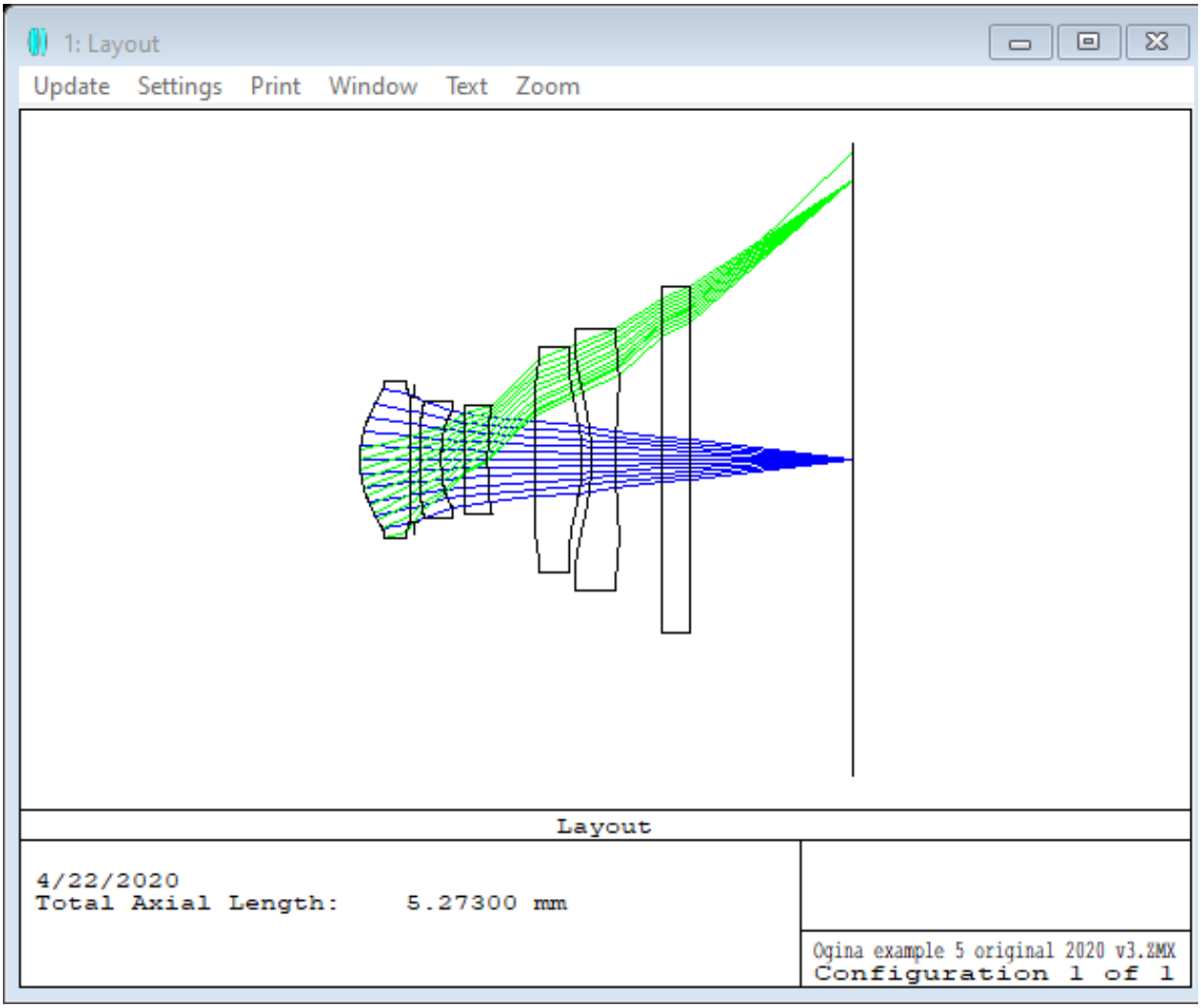
This figure is a "ray diagram," showing how rays of light bend and travel through lens assembly. Appx1197 (4:13–14). Each of the five lens elements has two curved surfaces (a front and a back), for a total of ten

curved surfaces, and each light ray bends as it crosses each surface. This ray diagram shows how rays that enter from the right as roughly parallel rays (for example all coming from a given point on an object that is far away) will be focused to the same point (or at least nearly so) at the image sensor. For example, three parallel horizonal rays from the central portion of the scene are shown entering from the left, and then bent by the various lens elements to all converge at the point labeled "2." Likewise, three parallel rays from the edge of the scene are shown entering diagonally from the left, and then bent by the various lens elements to all converge at the point labeled "3."

This ray diagram illustrates how the lens elements must function together as a unit. Changing where a given ray is bent or by how much—such as by changing the position, shape, or optical properties of a given lens element—may prevent the inbound parallel rays from converging at the right point, or at all.

Apple's expert, Dr. Sasián provided similar ray diagrams, both for the unmodified prior art lenses and for the modifications to those lenses that Apple relied upon to argue that certain challenged claims were obvious. Like Figure 7 in Ogino, these ray diagrams show a group of parallel

light rays that enter the lens assembly from the left and then converge (or fail to converge) approximately to a point at the right:



Appx1141 (Dr. Sasián's simulation of Ogino example 5).

Lens designs of the kind at issue in this IPR are defined by a large number of parameters. The surfaces of the lens elements are "aspheric," defined by an equation given in the '897 patent called the "sag" equation:

$$z = \frac{cr^2}{1 + \sqrt{1 - (1+k)c^2r^2}} + \alpha_1 r^2 + \alpha_2 r^4 + \alpha_3 r^6 + \alpha_4 r^8 + \alpha_5 r^{10} + \alpha_6 r^{12} + \alpha_7 r^{14}$$

Appx533 (3:46–4:14); Appx439. Each of the coefficients c, k, and α_1 through α_7 can be independently varied to change the shape of the surface defined by this sag equation, and each of the 10 lens element surfaces in the design has its own independent set of coefficients. For example, Table 2 of the '897 patent, together with the column labeled "Radius R" of Table 1, provide the 70 coefficients that define the shapes of the surfaces of each lens element in the first embodiment of the '897 patent. (Appx533, Tables 1 and 2).

Table 1 provides additional properties of the lens elements, including the thickness of each lens element at its center and the spacings between them, the optical properties of the material used for each lens (expressed as a "refraction index" and an "Abbe number"), and the diameter of each lens surface. Appx532–533 (Table 1, 2:16, 3:47–4:1). Altogether, the "prescription" for this first embodiment of the '897 patent includes 100 individual parameters for the five lens elements, or a total of 108 parameters

when the properties of the aperture "stop" and sensor cover glass "window" are included. Appx533 (Tables 1 and 2). The lens prescription provided in the Ogino patent for example 5 that Apple relies upon contains 115 parameters. Appx1206 (Tables 9 and 10).

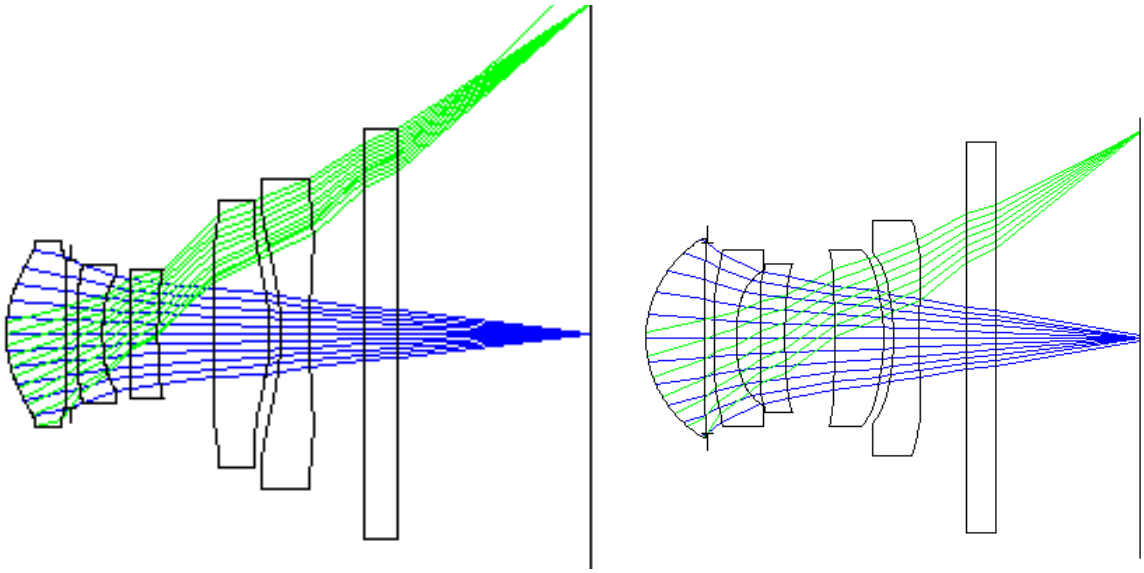
While these 100+ parameters of a lens prescription define a given lens design of the sort at issue in this IPR, there are other parameters that can be derived from these parameters that are also used in the '897 patent claims and relevant to the obviousness issues in the case. These parameters include the aforementioned TTL and EFL, as well as the focal lengths of the individual lens elements. They also include the "f-number," a ratio of the effective focal length to the diameter of the "entrance pupil," which relates to how much light the lens collects. Appx4476–4479 (¶¶ 41–45).

B. Apple Presents Three Theories of Obviousness for Grounds 2, 3, and 4

Ground 1 of this IPR argued that claims 1, 4, 9–15, 17, 20, and 25–29 of the '897 patent were anticipated by Example 5 of the Ogino reference. Appx17. The Board found that these claims were anticipated, and Corephotonics does not challenge that determination in this appeal.

For Ground 2, Apple argued that claims 2, 5, 6, 18, and 21–23 were obvious over the combination of Ogino and Bareau. Appx52. The Board found that these claims were obvious, and Corephotonics challenges that determination in its cross-appeal. Appx52.

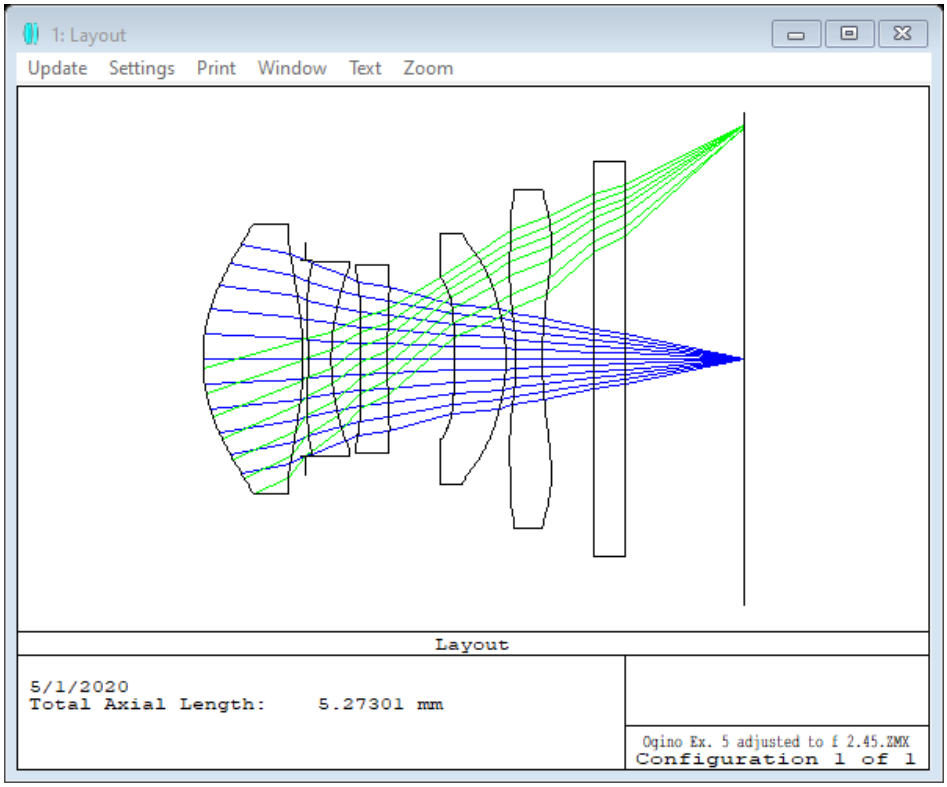
Each of the claims challenged in Ground 2 requires that the f-number be less than 2.9. Appx535–536 (8:37–39, 8:61–65, 10:4–6, 10:12–17). However, Ogino Example 5 has an f-number of 3.94. Appx1193; Appx4493–4494 (¶ 79). Apple pointed to the Bareau reference as purportedly providing a motivation to modify the Ogino design to have an f-number of 2.8. As a result, substantial changes to the Ogino Example 5 design were required, as seen by comparing Dr. Sasián's ray diagram of the original Ogino design (left) to his ray diagram of the modified design with f-number equal to 2.8 (right):



Appx1141; Appx1144. In the course of modifying the design, Dr. Sasián "[s]oftware-optimized for image quality using conic constants and aspheric coefficients." Appx1144. In other words, he modified every one of the 80 parameters for the lens prescription given in Table 10. Appx1206; Appx1147.

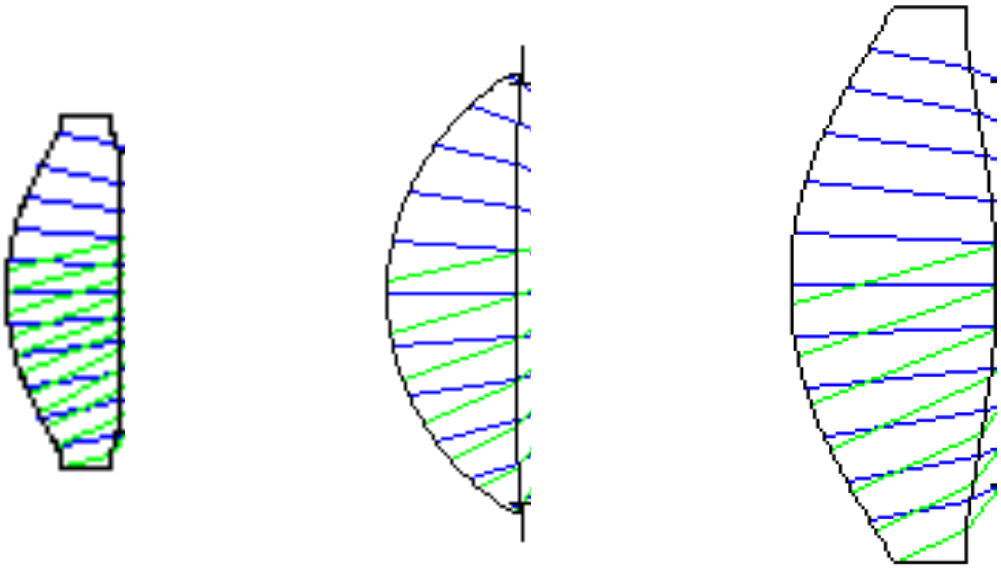
For Ground 3, Apple argued that claims 3, 8, 19, and 24 were obvious over the combination of Ogino, Bareau, and Kingslake. These dependent claims add further limitations, including limitations relating to the diameter and the shape of the image-side surface (i.e., the right-hand surface in the various lens drawings above) of the first lens element. Apple argued that this combination of references would have motivated one

skilled in to art to use a lens with a still-smaller f-number of 2.45. Purportedly motivated by the goal of reaching the f-number of 2.45, Dr. Sasián began with his lens design from Ground 2 and made numerous changes again, including changing the radii of curvature of both sides of the first lens element and again modifying all of the dozens of conic constants and aspheric coefficients, but with different values than in the Ground 2 lens. Appx1147, Appx1148, Appx1151. The resulting lens assembly in shown in the following ray diagram from Dr. Sasián:



Appx1148. These changes from the original lens of Ogino Example 5, to the Ground 2 modified lens, to the Ground 3 modified lens involved

changes to the sizes and shapes of each of the lens elements. This is perhaps most clearly seen by placing the first lens element of each design side-by-side:



Appx1141; Appx1144; Appx1148. In going from the lens element from the original Ogino design on the left to the design on the right, every single parameter of the lens element was changed except for the lens material. Appx4519–4520 (¶ 129).

For Ground 4, Apple argued that claims 16 and 30 were obvious—not over a modification of Ogino, but rather over a combination of Chen, Iwasaki, and Beich. The proposed combination is based upon Chen's Example 1, reducing the thickness of the cover glass purportedly based upon

Iwasaki, and choosing a diameter for the first lens purported based upon Beich. Appx43–44.[2]

SUMMARY OF THE ARGUMENT

1. In this IPR, the Board made factual findings and weighed expert testimony to conclude that Apple had not met its burden to prove that a POSITA would have been motivated to change the shape of a specific lens in multi-lens assembly from ***concave*** to ***convex***, as proposed in Apple's Ground 3. The Board also found, as a factual matter, that a POSITA would not have been motivated to change the diameter for that same lens in a manner that violated a rule for minimum tolerances in optical design from Beich, which supplied a different design rule on which Apple relied to modify the same lens, as proposed in Apple's ground 4. As a result, the Board correctly determined Apple had failed to prove unpatentability of claims 3, 8, 16, 19, 24, and 30 of the '897 patent. Both the

[2] Confusingly, the record in this IPR includes two "Chen" prior art patents, U.S. Patent No. 7,777,792 (Appx1307–1329) and U.S. Patent No. 10,324,273 (Appx1946–1985). Apple's list of abbreviations (Blue Br. 3) lists the former Chen patent (7,777,972) as "Chen," but the Chen prior art reference actually used in Ground 4 is the latter Chen patent (10,324,273 (Appx1946–1985)). When this brief refers to "Chen" it is referring to the Ground 4 prior art reference.

Board's factual findings, as well as its finding that Apple's expert opinions were insufficient and conclusory, support affirmance of the Board's decision with respect to those claims.

2. The Board also found claims 2, 5, 6, 18, and 21-23 to be unpatentable, based upon Apple's Ground 2. In so doing, the Board failed to address Corephotonics' argument that the lens design Apple created based on Ogino and Bareau was impossible to manufacture for any purpose, whether experimental or not. The failure to address this argument at all in its Final Written Decision violated the Administrative Procedure Act and requires vacatur and remand.

The Board further permitted Apple to fix fatal defects in Apple's original lens design in reply, which Apple submitted with a new expert declaration and an entirely new lens design to attempt to prove that a POSITA could, starting with Ogino and Bareau, come up with a lens design which both met the claims and be one a POSITA would create. This violated the Board's own rules and procedures and amounted to an abuse of discretion likewise requiring vacatur and remand.

ARGUMENT

I. The Board's Decisions Under Grounds 3 and 4 Should Be Affirmed

A. The Board Correctly Determined that Apple Failed to Sufficiently Explain a Motivation to Modify Ogino Example 5 to Obtain the Design Alleged to Satisfy Claims 3, 8, 19, and 24

The Board properly found that Apple failed to explain sufficiently why it changed the shape of the first lens element in the way it did for Ground 3. Appx42. As the Board noted, there was no suggestion in the art to make the specific change that Apple proposes (or any change that would satisfy the limitations of the challenged claims). Appx42. Rather, Apple's arguments in the IPR and in this appeal rest on the "unsupported conclusory statements" of its expert declarant. Appx42.

The purported motivation to modify Ogino's Example 5 to obtain the design utilized in Ground 2, and then further modify that design to obtain the design utilized in Ground 3, was to produce a lens with a lower f-number value of 2.45. Appx487–489. According to Apple, the Kingslake reference teaches a general preference for smaller f-numbers, and the Bareau reference teaches a preference for f-numbers of "2.8 or less." Appx487–488. (In fact, Bareau mentions f-numbers greater than 2.8, but

never f-numbers below, Appx1686–1687, and the page from Kingslake that Apple relies on never mentions any specific value of f-number at all, Appx1697.) According to Apple, a person skilled in the art would observe that Ogino Example 3 has an f-number of 2.45, Appx1991, and based upon that be motivated to modify Ogino Example 5, from a lens with an f-number of 3.94 to a lens with an f-number of 2.45. Appx488. Based on that motivation, Apple argued it would have been obvious to substantially modify the lens design, resulting in a lens that satisfies the added limitations of claims 3, 8, 19, and 24, while still satisfying the limitations of their parent claims. Appx489–492.

Notably, none of the prior art that Apple cited in this IPR satisfies the image-side surface diameter between 2.3 mm and 2.5 mm for the first lens element limitation of claims 3 and 19 or the convex image-side surface limitation of claims 8 and 24. Indeed, each of the six example lens assemblies in Ogino has a first lens element (L1) with a ***concave*** image-side surface, Appx4518 (¶ 125), and this is described by Ogino as a defining feature of its invention. Ogino explains that its invention uses a first lens that "has a positive refractive power and has a meniscus shape

which is convex toward the object side" (and thus concave toward the image side). Appx1202 (13:5–10). Ogino explains its reason for including this feature:

> by making the first lens L1, which is a lens closest to the object, have a positive refractive power and have a meniscus shape which is convex toward the object side in the vicinity of the optical axis, the position of the rear side principal point of the first lens L1 can be set to be close to the object, and thus it is possible to appropriately reduce the total length.

Appx1199 (7:31–37).

As explained above, Apple's proposed Ground 3 modification to Ogino changed more than 80 parameters of the lens prescription, including every single parameter of the first lens element L1 apart from the lens material. Appx4519–4520 (¶ 129). One of those dozens of parameters was the sign of the radius of curvature of the image-side surface, which determines whether than surface is concave (positive radius) or convex (negative radius). Appx1105; Appx1115. It is not surprising that a paid expert, with the challenged claims in front of him, could change every single parameter describing the shape of L1 (along with dozens of parameters describing the other lens elements) and thereby produce a shape for the first lens element that satisfies the challenged claims. But obviousness requires more than showing one skilled in the art can satisfy the claims

with the patent in front of them. Rather it requires showing that one skilled in the art would have been motivated to make the claimed invention without the benefit of the patent that is being challenged. *In re Stepan Co.*, 868 F.3d 1342, 1346 n.1 (Fed. Cir. 2017) ("there must be a motivation to make the combination and a reasonable expectation that such a combination would be successful"). As the Board found, Apple simply failed to carry its burden of showing such a motivation. Appx42.

Apple asserts that it provided "extensive evidence" showing a motivation to modify Ogino Example 5 to have a convex image-side surface. Blue Br. 26. But a careful review of this "evidence" shows that virtually none of it addresses the convex image-side surface—or the image-side surface diameter—and the evidence that does address these limitations is "unsupported conclusory statements" of Apple's expert, in the Board's words. *See* Appx42. Apple's brief first points to the motivation purportedly expressed through Kingslake, Bareau, and Wang to achieve an f-number of 2.8 or less. Blue Br. 26. But Apple does not explain how that that f-number has anything per se to do with the shape or diameter of the image-side surface of L1. Indeed, the modification to Ogino proposed for Ground 2 has an f-number of 2.8 and a concave image-side surface.

Appx483, Appx485. Apple then points to the pages of its petition purportedly explaining the proposed modification process "that renders the image-side surface convex." Blue Br. 26 (citing Appx489–491). But these pages of the petition also never mention the shape or diameter of the image-side surface of L1.

Importantly, the petition, reply, and their supporting expert declarations never claim that changing the f-number to 2.45 inevitably results in the image-side surface of L1 becoming convex. Apple *did* argue that at the oral hearing, but the Board correctly rejected that as attorney argument unsupported by evidence in the record. Appx40–41 (n. 11). The record actually shows that an f-number of 2.45 and concave image-side surface of L1 can co-exist, because that is exactly the situation for Ogino Example 3. Appx1191 (showing "Fno = 2.45"); Appx1202 (13:5–10, showing that all Ogino examples have a concave image-side surface for L1).

Indeed, Apple offered no evidence that a smaller f-number made a convex image-side surface of L1 more likely, or even that a smaller f-number made a convex image-side surface desirable in a way that is a consequence of the lower f-number design. Obviously, if there *were* evidence of this in the record, Apple's opening brief in this appeal would

have cited to it, rather than making generic arguments about the convex lens shape being "within the suitable choices a POSITA would have made." Blue Br. 33.

The only statement anywhere in the petition or the evidence cited in the petition that purports to explain a *reason* for changing the image-side surface of L1 to be convex is the following:

> The radius of curvature for the image-side surface of L1 was also changed from concave to convex to allow the L1 lens to better focus incoming light, to provide a thicker edge for easier manufacturing (see [Beich, Appx1303]) while maintaining its original focal length as much as possible.

Appx495; Appx1114–1115. While the Beich paper cited in this explanation addresses the issue of edge thickness, it in no way suggests that making a lens surface convex is desirable. If anything, by pointing to the need to avoid lenses whose center thickness is much greater than their edge thickness, Beich is pointing to a potential *disadvantage* of convex lens surfaces, which by definition require a center that extends outward beyond the surface's edge, tending to make the center thicker relative to the edge.

Taken together, the only explanation provided in the petition for changing the image-side surface of the first lens to be convex is the expert's assertions that this "allow[ed] the L1 lens to better focus incoming light" and that it "provide[d] a thicker edge," all "while maintaining its original focal length as much as possible." Appx1114–1115. The Board rightly rejected these "cursory" explanations as insufficient. Appx39. What exactly does it mean for a particular lens element to "better focus incoming light" and what does that have to do with its second surface being convex? How does making the image-side surface convex make the edge thicker? Are any of these purported benefits a consequence of changing the f-number, or are they independent of the f-number? Without some sort of explanation or evidence supporting these assertions, this is simply not a persuasive explanation for why one skilled in the art would have made the changes Apple proposes in Ground 3.

Apple next points to its reply, as purportedly showing that "changing the curvature of surfaces within a lens system is a well-known improvement technique." Blue Br. 26. But the evidence actually cited in the reply does nothing to further Apple's argument. The first piece of evidence is a paragraph from the end of Ogino's specification saying that its invention

is not limited to the specific numerical values of parameters such as radius of curvature provided in the patent's examples. Appx1203 (16:11–19). This routine near-boilerplate statement in a patent specification seeking to avoid limiting the invention to the disclosed embodiments is not a suggestion that the sign of the radius of curvature of a specific lens element surface should be flipped from negative (concave) to positive (convex), particularly when it occurs in the context of a patent that touts the advantage of a meniscus first lens with a convex object side and concave image side. Appx1199 (7:31–37).

The other piece of evidence cited in the reply is a 13-page section of a textbook by Smith. Appx536 (citing Appx1245–1257). But this section of Smith does not appear to mention the radius of curvature (instead referring to something called the "Petzval radius," Appx1250–1251). Apple does not explain how Smith suggests changing the image-side surface of the first lens element from concave to convex. The Board correctly found Apple's explanations in its reply to be insufficient. Appx39.

The Board "may reject even uncontroverted expert testimony when it is intrinsically unpersuasive." *Granite Constr. Co. v. United States*, 962

F.2d 998, 1006 (Fed. Cir. 1992). Indeed, this Court has held that "conclusory expert testimony is inadequate to support an obviousness determination on substantial evidence review." *TQ Delta, LLC v. CISCO Sys., Inc.*, 942 F.3d 1352, 1359 (Fed. Cir. 2019). Testimony inadequate to support an obviousness determination from the Board certainly cannot be sufficient to reverse a determination of non-obviousness. Moreover, a determination by the Board that a challenger failed provide evidence sufficient to carry its burden can itself meet the substantial evidence standard. *Comcast Cable Commun., LLC v. Promptu Sys. Corp.*, 838 Fed. Appx. 555, 557 (Fed. Cir. 2021) ("Substantial evidence supports the Board's finding that Comcast failed to show a motivation to combine . . . .") As motivation to make the proposed combination is a necessary element of obviousness, *Stepan*, 868 F.3d at 1346 n.1, the Board's proper rejection of Apple's evidence on this point is fatal to Apple's Ground 3 obviousness challenge.

Apple's remaining arguments largely miss the point, and they are insufficient to overcome Apple's fatal lack of sufficient evidence on motivation. For example, the Board did not impose on Apple a requirement that the changes Apple made to the image-side surface were the "best

option" for reducing f-number. Blue Br. 29. Rather, the Board found that Apple had failed to offer a sufficient explanation of how the changes to the image-side surface were related to the alleged benefits at all. *See In re Fulton*, 391 F.3d 1195, 1200 (Fed. Cir. 2004) (combination need not be the best available, but evidence must show it is "desirable"). It does not matter how strong the evidence of benefit from "incoming light, a thicker edge, and location of the aperture" (Blue Br. 29) may be, when the evidence connecting those features to the changes proposed for image side surface of the first lens fails. Likewise, it does not matter how many prior art references or decisions of the Board suggest a smaller f-number is desirable (Blue Br. 30), when the evidence connecting f-number to the changes to that image-side surface fails.

As for Apple's arguments in reply that the steps used by Apple to modify the Ogino lens are "gradual" and within the level of skill of a POSITA, Blue Br. 31, the Board correctly rejected these arguments as missing the mark. Appx39–40. Even assuming these statements are true, they go at most to the question of a reasonable likelihood of success. They do not provide a motivation to make the modifications in the first place. Nothing in that section of Apple's IPR reply explains why Dr. Sasián

chose the path of modification that involved changing the image-side surface of L1 to satisfy the limitations of the challenged claims, as opposed to some different path for achieving the purported goals of the modification. Appx5347–5348.

The fact that the petition "states that changing the shape was a choice based on letting more light in the lens" does nothing to solve Apple's failure to demonstrate motivation to make the proposed combination. Blue Br. 32. While Apple asserts that changing the shape to convex was done to reduce the f-number, it fails to adequately explain the connection between one and the other.

Apple's inherency argument is circular, unsupported by evidence, and properly determined by the Board to have been waived. Appx41. As the Board properly observed, the standard for inherency in an obviousness case is high. *PAR Pharm., Inc. v. TWI Pharm., Inc.*, 773 F.3d 1186, 1195–96 (Fed. Cir. 2014). The allegedly inherent limitation "necessarily must be present, or the natural result of the combination of elements explicitly disclosed by the prior art." *Id.* at 1196. The purported "concessions" from Corephotonics cited in Apple's brief do not show that the combination of lower f-number and the Ogino lens designs "necessarily"

or "naturally" result in a convex image-side surface for L1. Nor could they, as Ogino itself discloses a lens assembly with f-number of 2.45 and concave image-side for L1. Appx1191 (showing "Fno = 2.45"); Appx1202 (13:5–10, showing that all Ogino examples have a concave image-side surface for L1). All the "concessions" show is that for the *specific* set of changes that Dr. Sasián made to the Ogino lens design, the resulting image-side surface is convex. Blue Br. 34. Corephotonics has not conceded that Dr. Sasián's set of modifications was "necessary" or "natural," or anything other than the improper application of hindsight.

The Board properly found that Apple failed to present sufficient evidence or explanation of why a person skilled in the art would have been motivated to change the image-side surface of L1 in the ways necessary to satisfy the claims. Its finding is supported by substantial evidence and by its thorough review of the evidence and arguments offered by Apple. It should be affirmed.[3]

[3] Should the Court decide otherwise, a remand to the Board would be appropriate for the Board to fully consider other arguments offered by Corephotonics concerning errors in Dr. Sasián's analysis. Appx41.

B. No Separate Analysis of the Obviousness of Claims 3 and 19 Was Required Once the Board Found a Failure to Show Motivation to Make the Changes that Apple Relies Upon to Satisfy All of the Claims Challenged in Ground 3

Apple argues that the Board was required to provide a separate analysis for dependent claims 3 and 19 of the '897 patent and their limitations requiring an image-side surface diameter between 2.3 mm and 2.5 mm for the first lens element. What Apple's argument ignores is that the proposed modifications to the Ogino lens design are *exactly the same* for both sets of claims. Apple itself presented only *one* modified lens design, based on a *single* set of arguments for motivation to modify the prior art design.

The motivation to modify arguments are identical for all four claims at issue in Ground 3, even if the limitations at issue may differ. Moreover, the limitations at issue in the claims challenged under Ground 3 relate to two parameters (diameter and convex shape) for exactly the same lens surface, the image side surface of the lens element the claims call "L_{1_1}." Appx535 (8:40–43, 9:1–2, 10:7–10, 10:18–19). Since the changes to the Ogino lens design are the same and the motivations Apple presented to make those changes are exactly the same, finding that there was no motivation to make these changes for the purposes of obviousness of claims

8 and 24 necessarily means no motivation for the purposes of obviousness of claims 3 and 19, and vice versa. Given that the central question was one of motivation to make the proposed changes, the Board could ***not*** have found some of the claims challenged under this ground obvious and others not, as Apple's brief suggests it should have.

To the extent that Apple is arguing that it would have been obvious to change the diameter of the image-side surface of L1 *without* changing the shape, it never made such an argument before the Board. Rather, the only allegedly obvious modification to Ogino that Apple identified for the image-side surface diameter limitation is identical to the allegedly obvious modification to Ogino identified for the convex surface limitation. Appx493; Appx495. To show obviousness of claims 3 and 19, Apple needed to show a motivation to change the image-side surface diameter to be between 2.3 mm and 2.5 mm, while also maintaining the numerous other parameters of claims 3 and 19 and their independent claims, such as the TTL value, ratio TTL/EFL, and the refractive powers of the various lens elements. Appx535 (8:22–37, 9:26–10:3). Apple did not even attempt to show this, outside of the context of the set of modifications that included making the image-side surface of L1 convex. Because Apple failed

to provide adequate evidence or explanation of a motivation to make that set of interrelated changes to the Ogino design, the Board correctly rejected Apple's obviousness challenge to all four of the claims in Ground 3.

C. The Board Correctly Determined That a POSITA Would Not Have Been Motivated to Choose the Proposed Diameter for Chen's First Lens Element, Considering the Teachings of Beich as a Whole

Dependent claims 16 and 30 require that the first lens element have a ratio of the "largest optical axis thickness L11 and a circumferential edge thickness L1e" of less than 3. Appx536 (9:22–25, 10:34–37). In the proposed combination of Apple's Ground 4, the first lens element is simply the first lens element L1 from Chen Example 1. Appx509. Because this L1 lens element in Chen Example 1 is thickest at its center, the "largest optical axis thickness" is the center thickness of the lens element. Accordingly, the limitations of claims 16 and 30 require that the L1 lens have a center-to-edge thickness ratio of less than 3. Appx1949.

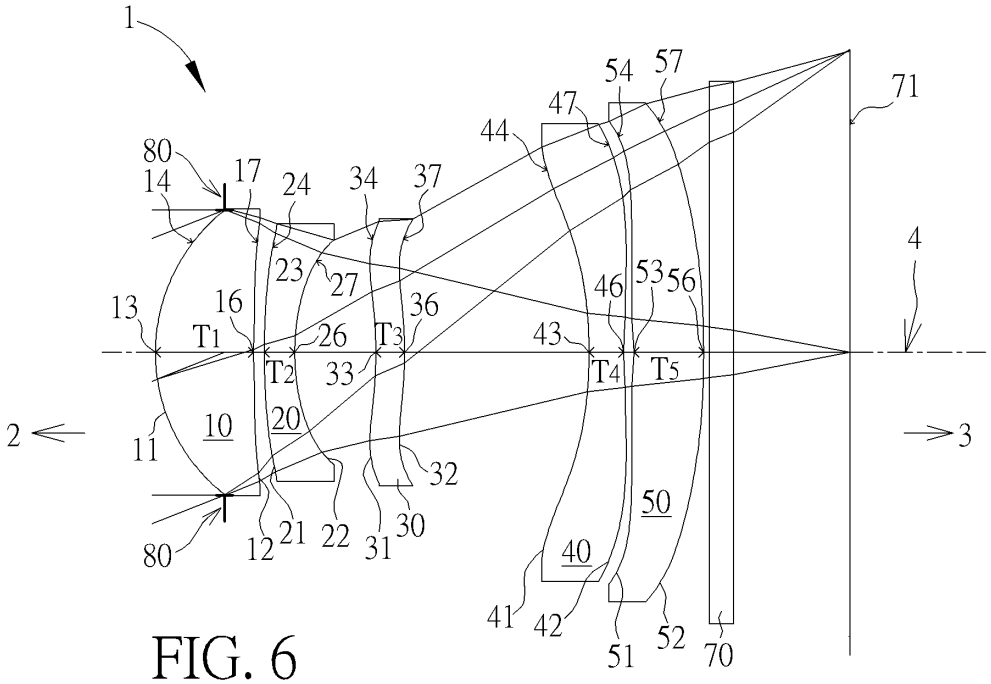


FIG. 6

Appx1949. It is undisputed that Chen does not specify the diameters of its various lens elements or their edge thicknesses. Appx504. Because the L1 lens element gets progressively thinner toward its edge, the edge thickness (and thus the center-to-edge thickness ratio) depends on the lens element diameter. A larger diameter means a thinner edge thickness and a larger center-to-edge thickness ratio.

The Beich reference provides a set of "Rules of Thumb" for plastic injection-molded lenses, including a rule of thumb that the "Center Thickness to Edge Thickness Ratio" should be less than 3:1. Appx1303. Apple argued that based upon this rule of thumb in Beich, a POSITA

would have chosen a center-to-edge thickness ratio of 2.92, to permit easier plastic injection molding. Appx514. This corresponds to a lens semi-diameter of 1.2375 mm, barely 0.004 mm larger than the 1.2333 mm semi-diameter of the aperture stop, which limits how wide a bundle of light rays can enter the lens assembly. Appx4525-4526 (¶ 142). Perhaps not coincidentally, the resulting lens diameter is essentially the smallest that it could be without disrupting other characteristics of the Chen lens assembly Apple relies upon to satisfy claim limitations such as the f-number. Appx4526 (¶ 143).

The diameter of the L1 lens is thus balanced on a proverbial knife edge. Make the diameter just slightly larger, and the claimed center-to-edge thickness ratio is violated. Make it just slightly smaller (without changing the size of the stop and thus the f-number), and the lens will be smaller than the stop, and light will leak and scatter around the lens and cause an undesirable haze in the image. Appx4526–4528 (¶¶ 143–148). Because the lens is by design only 0.008 mm larger in diameter than the diameter of the aperture stop, expected variation in manufacturing will produce lenses that leak light. Appx4527–4528 (¶ 147). But the same table of "Rules of Thumb" from Beich, which provides the 3:1 center to edge

thickness ratio, addresses manufacturing variance: it prescribes a lens diameter manufacturing tolerance of 0.020 mm, greater than 0.008 mm. Appx1303.

Because the lens diameter that Apple proposes results in a lens design that requires tighter manufacturing tolerances than Beich teaches to be achievable, the Board found that one skilled in the art would not select Apple's proposed lens diameter, based upon Beich. Appx47. Apple does not dispute the Board's finding that the proposed combination requires manufacturing tolerances that are inconsistent with Beich's rules of thumb. Rather, Apple argues that the Board was *required* to ignore Beich's teachings concerning manufacturing tolerances when evaluating Apple's obviousness argument. Blue Br. 36.

Apple is mistaken. The sole argument that Apple provides for choosing a lens diameter that results in the lens design satisfying claims 16 and 30 is the rules of thumb of Beich and the goal of "easier plastic injection molding." Appx514. The Board's determination that one skilled in the art, considering Chen in combination with Beich, would ***not*** have been motivated to choose that lens diameter is supported by substantial

evidence in the form of Beich's rules of thumb and the undisputed consequences of manufacturing variation on the lens with the diameter proposed by Apple.

As the Board explained, this situation is different and distinguishable from the situation presented in the *1961 Appeal*. First, the combination of references and the allegedly obvious combination in that case was different than in Ground 4 of the present case. There, the combination at issue was of Ogino Figure 6 with Beich, as opposed to Chen, Iwasaki, and Beich in Ground 4 of this case. *Corephotonics, Ltd. v. Apple Inc.*, 2020-1961, 2021 WL 4944471, at *5 (Fed. Cir. Oct. 25, 2021).

In the *1961 Appeal*, Beich and its center-to-edge thickness < 3:1 rule of thumb was used in a similar way to how it is being used in the present case, as purportedly teaching a lens diameter and edge thickness for a reference that teaches neither. *Id.* at *5. But Corephotonics' argument against obviousness in the present case is substantially different from its argument in the *1961 Appeal*. There, Corephotonics did not argue that the L1 lens diameter was inconsistent with Beich's manufacturing tolerances or provide any reason that a POSITA would *not* have chosen the

L1 lens diameter proposed by Apple based upon Beich. Rather, Corephotonics' argument was that Apple's proposed design was improper because it followed the Beich rules of thumb *only for the L1 lens element*, because different lens elements in the Ogino design violated a different "Diameter to Center Thickness Ratio" rule of thumb. *Id.* at *5. The Court held that "the Board reasonably found that not all rules of thumb had to the applied to all lenses in an assembly in order for some to be applied to some lenses." *Id.*

The fact that the Board was reasonable in the *1961 Appeal* to find that some rules of thumb could be applied to some lens elements, without all of the other rules of thumb needing to apply to all of the other lens elements, does not mean that the Board's decision in the present case was *unreasonable*. In the present case, both the Beich center-to-edge thickness rule of thumb relied upon by Apple and its manufacturing tolerances rule of thumb pointed to by Corephotonics bear on the exact same unspecified parameter for the same lens element from Chen Example 1, i.e., the diameter (and thus edge thickness) of the L1 lens element. A prior art reference must "be analyzed as a whole." *Gen. Elec. Co. v. Raytheon Techs. Corp.*, 983 F.3d 1334, 1352 (Fed. Cir. 2020); *Fulton*, 391 F.3d

at 1200. It would not make sense for a POSITA to choose a L1 lens diameter based upon Beich's injection molding manufacturability rules of thumb, but then ignore the fact that the same lens diameter imposes manufacturing tolerances tighter than permitted by those same rules of thumb.

The Board's decision in this case did not rely on "blanket assertion[s]" that costs and manufacturability concerns were all or nothing. Blue Br. 38. It also expressly recognized the existence of manufacturability tradeoffs. Appx51. The Board did not require Apple to prove that the diameter in Apple's proposed combination was the "most desirable" option. Blue Br. 38. Rather, the Board found, considering the Beich reference as a whole, that the diameter Apple proposes was not desirable at all. Appx50–51.

As for Apple's suggestion that remand is required to address teaching away, that suggestion should be rejected. Appx39–41. The Board expressly recognized that the issue of teaching away "was not raised or argued" and thus was not properly before the Board. Appx51. The Board also did not find that there was teaching away, instead observing that the tolerance rule of thumb in question "could be argued to teach away."

Appx51. The sentence that mentions teaching away could be removed from the final written decision without changing its reasoning or the outcome, because nothing in the decision before that sentence or after it relies upon that sentence. To turn any single-sentence tangential observation about evidence or arguments that could have been raised into grounds for remand would both needlessly increase the remand workload of the Board and force it into a needlessly cramped style of decision writing that would make it more difficult for the Board to communicate to readers what arguments it might be receptive to in future cases.

Apple's suggestion that remand is required to address Apple's argument in its reply that a POSITA could have modified Chen Example 1 in a different way that satisfied the Beich manufacturing tolerances should likewise be rejected. Apple argues that "the Board erred in failing to consider" this reply argument, suggesting that the Board excluded the argument on the grounds it was untimely. But the final written decision is clear that while the Board called the argument "late," it nonetheless considered the argument and properly found it unpersuasive. Appx48. The argument—which Apple says demands a remand to consider—occupies a full two sentences of Apple's reply. Appx5352. The first sentence argues

that it would have been obvious to modify Chen based upon a new, unspecified motivation "besides ease of manufacturing." Appx5352. The second sentence argues that based upon this unspecified motivation, the POSITA would have arrived at some unspecified new design based upon Chen Example 1 that meets the Beich manufacturing tolerances. Although the motivation and the detailed design are unspecified, Apple expressed confidence that the result would still satisfy the limitations of the challenged claims 16 and 30. This is barely the outline of an obviousness argument, let alone a legally sufficient showing of obviousness. The Board properly rejected it.

The Board properly disregarded the argument in Apple's expert's reply declaration that the lens designer would not have been bound by manufacturing tolerances from Beich. Blue Br. 41. The Board correctly observed that the manufacturability concerns of Beich are the rationale that Apple provided to determine the otherwise unspecified L1 lens diameter and edge thickness for Chen Example 1. Appx47–48. Apple cannot rely on Beich's rules of thumb as motivation to choose the lens

diameter, but simultaneously argue it need not explain why the lens designer would disregard other rules of thumb when selecting that same lens diameter.

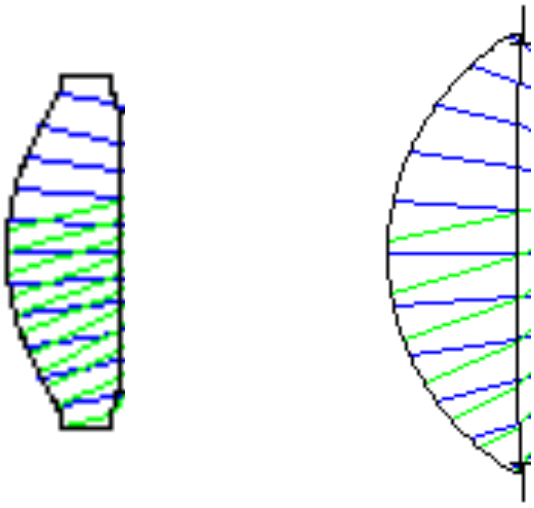
The Board properly considered the evidence and all of the arguments and half-arguments made by Apple. It reasonably reached the conclusion that Apple had failed to demonstrate a motivation to combine the references in a way that satisfies the challenged claims of Ground 4. Any superficial inconsistency with the outcome in the *1961 Appeal* is justified due to the different prior art at issue and the fact that in this case, unlike in the *1961 Appeal*, Corephotonics identifies a conflict with the Beich rules of thumb for the very same lens element and very same parameter where Apple argues Beich is providing the motivation to choose the necessary value. The Board's determination is amply supported by substantial evidence and show be affirmed.[4]

[4] Should the Court decide otherwise, a remand to the Board would be appropriate for the Board to fully consider other arguments offered by Corephotonics concerning errors in Dr. Sasián's analysis. Appx49–50.

II. The Board's Decisions Under Ground 2 Should Be Vacated and Remanded

A. The Board Improperly Failed to Fully Address Corephotonics' Arguments Demonstrating a Lack of Reasonable Expectation of Success

Apple's Ground 2 proposes modifying Ogino's Example 5 lens in order to change the f-number of the lens from 3.94 to 2.8. Appx479–480. As explained above, the modification proposed by Apple includes a substantial change to the shape of the first lens element:



Appx1141; Appx1144. Most noteworthy is the substantially thinner edge of the lens and the steeper slope of the front lens surface as it approaches that thin edge. The undisputed analysis of Corephotonics' expert shows that the edge thickness of the modified design lens is 0.0394 mm, or about

half the thickness of a typical human hair, and the slope of the surface at the edge is 58.86 degrees. Appx4503–4504 (¶¶ 98–99). Moreover, the lens element in this modified design has to have this shape and slope in order to achieve the f-number of 2.8, which is the f-number Apple sought to obtain in order to argue obviousness of claims requiring an f-number less than 2.9, based upon the f-number teaching of Bareau. Appx4502 (¶ 97).

Corephotonics presented extensive evidence, including the detailed analysis of its own expert and the textbook written by Apple's expert, to show that it would be extremely difficult to construct a physical lens with the parameters of the first lens element called for in Apple's proposed f-number 2.8 modification to Ogino. Appx4498–4515 (¶¶ 88 – 122). This analysis considered a full range of techniques used for fabricating lenses, including injection molding of plastic (Appx4498–4515, ¶¶ 60, 62, 77–78, 103–108, 112, 117, 121), injection molding of glass (Appx4498–4515, ¶¶ 60, 63, 103–108, 112, 117, 119, 120), grinding or polishing of glass (Appx4498–4515, ¶¶ 60, 63, 104–107, 110, 117, 119, 120), and diamond turning (Appx4498–4515, ¶¶ 104, 107, 117, 120, 121).

This analysis also identified issues that would prevent successful fabrication of the proposed design, regardless of the technique used. For

example, an actual lens would need to have rounded or chamfered corners, rather than sharp 90-degree corners, regardless of the fabrication technique used. Appx4507–4508 (¶¶ 106–107). As Dr. Sasián's textbook explains "[i]t is imperative that a bevel, or protective chamfer, is specified to avoid the lens edge easily chipping." Appx4598. The thin edge and steep slope required by the proposed design make it impossible to incorporate rounded or chamfered corners, while retaining the desired f-number and other properties of the proposed design. Appx4510 (¶ 111).

Furthermore, the lens elements must be physically mounted to a lens barrel or similar structure in order to maintain the positions and spacing called for in the lens prescription. Appx4505 (¶ 101). This mounting requires a flange connected to and extending from the edge of the lens element. Appx4505 (¶ 101). But the extremely thin (less than half the thickness of a human hair) edge of the modified L1 will require extremely thin flanges that are subject to chipping and cracking. Appx4513 (¶ 117).

Based upon this evidence assembled and analyzed by its expert Dr. Milster, Corephotonics argued that "Apple's proposed design, with its edge thickness of 0.0394 mm, edge slope of 58.86°, center-to-edge ratio of 15.238, lack of oversizing, and sharp corners, cannot be successfully made

using any technique for lens manufacture . . . ." Appx6154. Put another way, Corephotonics argued that Apple could not show that one skilled in the art had a reasonable expectation of succeeding in fabricating an actual physical lens with the shape and properties of the Ground 2 proposed modification to Ogino.

The Board's decision fails to acknowledge, let alone properly address, this argument. Instead, the Board reasoned that Apple need not have demonstrated "manufacturability," based upon the doctrine of claim differentiation. Appx31–32. As discussed above, claims 16 and 30 include a requirement that the ratio between the largest thickness and edge thickness for the first lens element be less than 3. Appx536 (9:22–25). The '897 patent specification states that keeping this ratio small improves manufacturability and quality of the lens assembly. Appx532 (2:43–50). But the fact that certain claims contain limitations meant to improve manufacturability does not mean that manufacturability is irrelevant to the obviousness of other claims, particularly where Corephotonics has plausibly argued, based upon extensive evidence, that there was no reasonable expectation of successful fabrication.

The Board then concluded that Apple had shown that a POSITA would have been motivated to make the lenses created by Apple's expert "for experimental or research purposes." Appx33. But this determination was not supported by substantial evidence. First, as discussed above, Corephotonics presented extensive evidence showing that there was no reasonable expectation of successful fabrication "using any technique." Appx6154. Second, the evidence that the Board cites to support its determination consists principally of two paragraphs from the reply declaration of Apple's expert. Appx33 (citing Appx6108–6109 (¶¶ 16–17, 19)).

But these paragraphs from Apple's expert do not plausibly rebut Corephotonics' reasonable expectation of the success argument. Rather, the expert states that one skilled in the art would have been motivated to design the lens in question for "experimental or research purposes," not that the POSITA would have expected to be successful. Appx6108–6109 (¶¶ 16–17). To the extent that these paragraphs from the declaration address the expectation of success issue, it is only to argue that experimental or research designed wouldn't need to use "mass-produced injection molding." Appx6108 (¶ 16). But that does not actually address Corephotonics' expectation of success arguments, which are not limited

to injection molding. Appx4498–4515. On the key question of whether the lens design was physically producible, the declaration is utterly conclusory, insufficient to provide substantial evidence. *See TQ Delta*, 942 F.3d at 1359 ("conclusory expert testimony is inadequate to support an obviousness determination on substantial evidence review")

Under the APA, the Board must fully and particularly set out the bases upon which it reached its decision. *In re Sang-Su Lee*, 277 F.3d 1338, 1342 (Fed. Cir. 2002). To permit meaningful appellate review, the Board's patentability analysis must be "clearly disclosed and adequately sustained." *See SEC v. Chenery Corp.*, 318 U.S. 80, 94, 63 S.Ct. 454, 87 L.Ed. 626 (1943); *In re Thrift*, 298 F.3d 1357, 1364 (Fed. Cir. 2002) (emphasizing that the Board is required to "document its reasoning on the record to allow accountability" and to facilitate "effective judicial review"). The Board's failure to even acknowledge Corephotonics' argument that Apple's lens proposals would have been recognized by a POSITA to be impossible to manufacture (for any purpose), much less provide meaningfully analysis, "precludes [the Court] from engaging in meaningful appellate review and, therefore, violates the APA." *Provisur Techs., Inc. v.*

Weber, Inc., No. 2021-1942, 2022 WL 4474941, at *4 (Fed. Cir. Sept. 27, 2022).

B. The Board Abused its Discretion by Allowing Apple to Introduce a New Theory of How Ogino and Bareau Could be Combined

The Board also erred when it credited a new lens design based on Ogino and Bareau that Apple presented for the first time in its IPR reply. The Board acknowledged that Apple's IPR reply had proffered an "additional proposed lens design" but held that it was "proper" rebuttal evidence. The Board characterized Apple's new lens design as responding to criticisms raised by Corephotonics that the initial lens design proposed in the Petition's Ground 2 arguments was "unsatisfactory for its intended purpose or would have frustrated Petitioner's asserted motivation to combine." Appx34–35. The Board further stated: Corephotonics "was given the opportunity to address this alleged new theory in its Sur-Reply." Appx35.

The Board abused its discretion by allowing Apple to rectify fatal defects in its obviousness arguments by having its expert create and submit a new lens design in its IPR reply. *See Wasica Fin. GmbH v. Contl. Auto-*

motive Sys., Inc., 853 F.3d 1272, 1286 (Fed. Cir. 2017) ("Rather than explaining how its original petition was correct, Continental's subsequent arguments amount to an entirely new theory of prima facie obviousness absent from the petition. Shifting arguments in this fashion is foreclosed by statute, our precedent, and Board guidelines."); *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016) ("It is of the utmost importance that petitioners in the IPR proceedings adhere to the requirement that the initial petition identify 'with particularity' the 'evidence that supports the grounds for the challenge to each claim.'").

This is not a case where a petitioner, in response to arguments raised by the patent owner, identifies additional evidence in support of its original theories of invalidity. Here, Apple generated a "new theory of prima facie obviousness absent from the petition" when Corephotonics pointed out the impracticability of the unmanufacturable lens design Apple's expert had created for the Petition. Apple's introduction of a new lens assembly in its reply was in support of a new argument that a POSITA, using the same base prior art, could create another lens assembly—not previously presented in the Petition—that ***would*** be manufacturable.

This was a "meaningfully distinct contention" separate from Apple's Petition arguments (*Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359, 1367 (Fed. Cir. 2015)) that required Apple's expert to go back to his lens design software and change multiple optical variables specifically to come up with a new design that rectified the defects in his initial lens design.

But "shifting arguments in this fashion is foreclosed by statute, our precedent, and Board guidelines." *Wasica*, 853 F.3d at 1286. In permitting Apple to cure those defects in its Ground 2 arguments with a new lens design, the Board allowed Apple to argue in reply unpatentability based on a completely new theory of how Ogino and Bareau could be combined. This was an abuse of the Board's discretion and requires reversal.

CONCLUSION

For the foregoing reasons, the Board's determinations that the claims challenged under Grounds 3 and 4 we not shown unpatentable should be affirmed. The Board's determinations that the claims challenged under Ground 2 are unpatentable should be vacated and remanded to permit a proper consideration of the evidence and arguments presented by Corephotonics.

Dated: October 7, 2022

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE

The foregoing filing complies with the relevant type-volume limitation of the Federal Rules of Appellate Procedure and Federal Circuit Rules because the filing has been prepared using a proportionally-spaced typeface and includes 8,729 words.

Dated: October 7, 2022

/s/ Neil A. Rubin
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